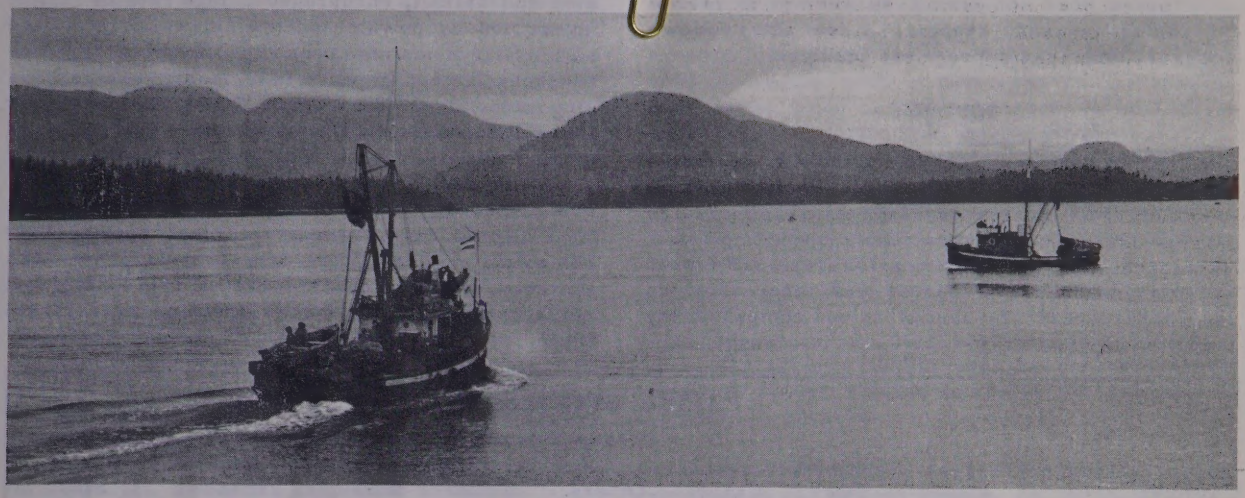

Purse-seiners scouting for salmon off the British Columbia coast.

The Commercial Fisheries of Canada

By HAROLD C. FRICK

ECONOMIC progress requires the continual adaptation and re-orientation of industry to make use of new and more productive methods to supply the continuing, changing, and infinitely varied wants of consumers everywhere. Change in any one industry is necessarily dependent upon developments in others, and upon the social and economic "climate" of the country and of the world. Moreover, the rate of change is seldom constant, but slow and fast by turns as the many factors involved exert their influence in one direction or another. This complicates the work of the economic forecaster, who must estimate the rate of change as well as the trend that may be indicated by past events, and at the same time weigh them against the probable effects of coming changes that are in some degree predictable. Because some major influences such as war and economic depression cannot be accurately foretold, the forecaster -- if he is wise -- is likely to qualify his predictions by setting out the conditions under which they will be valid.

Such was in part the nature of the task of forecasting the state of the Canadian fisheries industry in the year 1980, undertaken by staff members of the Economics Service of the Department of Fisheries and the Fisheries Research Board in writing the report on The Commerical Fisheries of Canada for the Royal Commission on Canada's Economic Prospects. The report has now been published. It is composed of six chapters on the history, the resources, and the products of the Canadian fisheries, marketing organization and prices, the future demand for fishery products and, finally, the capital requirements for fisheries development and prospective changes in employment and earnings. Useful statistical tables and other information are contained in appendices.

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DEALS WITH BASIC ELEMENTS

From the subject-matter of these chapters, it can be inferred that the report deals with basic elements affecting the future demand for, and supply of, Canadian fisheries products. Among these are the growth of population and changes in the level of income and their effects on total food consumption. When estimates of the prospective demand for particular fish species or groups of species have been made they have to be reconciled with probable limitations on supply imposed by fish stocks and by price-cost relationships. Relevant considerations here are the probable effects of fisheries exploitation on the stocks as well as certain conclusions about the efficacy of conservation measures that are being or are likely to be carried out. Prices and costs are important because it cannot be expected that production will be continued for long if the price realized is not sufficient to cover costs of production including the fisherman's "opportunity cost" -- the income available to him in another occupation.

Space does not permit an attempt to review the contents of each chapter. A few notes follow, however, under the appropriate headings.

HISTORY

The Canadian fishing industry was dependent mainly upon canned and cured products for many years, until the gradual development of refrigerated storage and distribution facilities opened up a volume market in North America for fresh and frozen fisheries products. Progress was more rapid on the Pacific Coast: the abundance and comparatively high market price of the chief species caught, salmon and halibut, encouraged a high rate of capital investment by private enterprise, while relatively high labour costs also constituted a strong stimulus to mechanize and improve fish catching and processing methods. On the Atlantic Coast, comparatively low-valued cured fish products were the mainstay of the industry, labour was cheap because of the generally low level of incomes and a scarcity of employment opportunities alternative to fishing, and little capital was available for investment in modernization of boats, gear, and plant equipment. However, with the development of filleting and quick-freezing, there was a gradual shift toward fresh and frozen groundfish production, and after

PACIFIC SPECIES

Species	Present Stock	Present Utilization				Probable Catch Trend	Prospective Stock 1980
		Canada	Others	Total	Rate		
	million lb.	million lb.	million lb.	million lb.	per cent		million lb.
Salmon:							
Sockeye	84	41	16	57	68	increase	304
Chum	150	58	23	81	61	increase	300*
Pink	116	45	13	58	50	increase	230*
Coho	40	23	-	23	58	increase	40
Spring	22	13	-	13	59	increase	20
Steelhead	5	1	-	1	20	increase	5
Sub-total, salmon	417	181	52	233	56	increase	899*
Halibut	700	24	38	62	9	increase	600
Herring	790	380	-	380	48	increase	790
Groundfish#	1,012	24	28	52	5	increase	1,166

* Revised estimates.
\# Including grey cod, lingcod, blackcod, flatfishes, rockfishes, dogfish and others.

ATLANTIC SPECIES

Species	Present Stock	Present Utilization				Probable Catch Trend	Prospective Stock 1980
		Canada	Others	Total	Rate		
	million lb.	million lb.	million lb.	million lb.	per cent		million lb.
Groundfish:							
Cod	6,800	710	400	1,110	16	increase	6,500
Haddock	480	112	90	202	42	decrease	340
Redfish	2,200	38	124	162	7	increase	1,350
Pollock, hake, cusk and wolffish	640	70	9	79	12	increase	540
Halibut	60	6	-	6	10	no change	60
Other flatfish*	590	66	6	72	12	increase	490
Sub-total, groundfish	10,770	1,002	629	1,631	15	increase	9,280
Salmon	10	4	-	4	40	increase	20
Lobster	73	48	-	48	66	no change	67
Herring	3,800	240	-	240	6	increase	3,500

* Including with the small flatfishes, present and prospective stocks (unchanged) of turbot (20 million lb.) and the skates (70 million lb.) and a Canadian catch of one million lb. of turbot.

World War II relatively favourable fish prices helped to increase the supply of venture capital for investment in modern boats and in the improvement, consolidation and concentration of processing operations. In this development, financial assistance by the provincial and federal governments played an important part.

Nevertheless, the productivity and incomes of fishermen remain low in certain areas on the Atlantic Coast and also in the inland region, the most seriously retarded branch of the industry being the inshore salted cod fishery of Newfoundland. The catch per man of the small-boat crews is small and their productivity is further limited by the time taken up in splitting, salting and drying the fish. Replacement of the fisherman's manual processing methods by mechanical drying in centralized curing stations should produce a better quality, more uniform product, and at the same time enable the fisherman to land more fish. Such methods are already well-established elsewhere in Canada, but substantial amounts of capital will be required to finance the necessary concentration and mechanization of curing operations in Newfoundland, as well as larger, more efficient fishing units to supply the raw material.

THE RESOURCES

The fishing grounds of the continental shelf on Canada's east and west coasts are among the richest in the world, and Canada's inland waters, comprising about one-half of the fresh-water area of the world, support extensive fresh-water fisheries. The Canadian commercial catch of fish and shellfish amounts to some two billion pounds a year, with a marketed value close to $200 million. More than 150 species have commercial significance, but the major groups upon which the Canadian industry is based are: (1) the groundfish group (excluding halibut) -- particularly Atlantic cod, haddock and redfish (ocean perch); (2) halibut; (3) the Pacific salmons; (4) herring; (5) Atlantic lobster; and (6) the group of freshwater species -- particularly whitefish and pike-perch.

An increased total Canadian and foreign catch is forecast for most of the Atlantic groundfish species except haddock. The stock of cod represents about two-thirds of known Atlantic groundfish resources and the present catch rate of 16 per cent of the stock leaves room for a large increase in landings. The present utilization of haddock is estimated to be 42 per cent of the stock; that of redfish and the small flatfishes, 7 and 14 per cent, respectively, of their stocks. An increased catch of Pacific groundfish is probable, but the stocks are less than 10 per cent of those of the Atlantic.

Some increase is seen for the catch of Pacific halibut, of which about 62 million pounds a year are taken (the Canadian share being about 40 per cent). An annual catch quota is imposed under the Northern Pacific Halibut Convention, and competition among fishermen for a share of the catch has increased the number and efficiency of halibut vessels until the yearly quota is now taken in a few weeks. Most of the catch is marketed over the year in the dressed frozen form. It is thought that the recovery of the halibut fishery under international management over the past twenty years may be explained in part by higher average water temperatures and by faster recruitment and growth resulting from the reduction in the density of the stock. If so, a moderate increase in exploitation might be both feasible and desirable.

The Atlantic halibut catch is only one-tenth as great as Pacific halibut landings. No increase is foreseen at present.

The total annual catch of the Pacific salmon species, at 233 million pounds, is thought to represent about 56 per cent of the combined stocks in Canadian waters. The Canadian catch is about three-quarters of the total and the Pacific salmon group is the most important in the Canadian fisheries. An increase of more than 100 per cent in the combined stocks by 1980, to about 900 million pounds, is thought possible because of the success of international conservation measures under the International Pacific Salmon Fisheries Convention, such as seasonal closure regulations to ensure adequate escapement of spawning stocks, the construction of fishways past dams, and the removal of stream obstructions. For instance, a five-fold increase in the Fraser River sockeye stock might be brought about. The chief threat to restoration of the Fraser sockeye run lies in prospective power development on the river; salmon by-pass facilities for the large dams proposed would be astronomical in cost and they would also be ineffective if they delayed the fish beyond their spawning time or beyond the period of suitable water temperatures.

The catch of Atlantic salmon is about four million pounds yearly, representing perhaps 40 per cent of the stocks. The stock might be doubled if present measures to control predation by the American merganser and to remove or by-pass obstacles to the ascent of streams by spawning salmon are not nullified by urban and industrial stream pollution or by the effects of logging activities and forest spraying for control of the spruce budworm.

Pacific herring are caught chiefly for reduction to fish meal and oil. The current catch of 380 million pounds is close to 50 per cent of the present stock. It is thought that the stock would sustain a catch increase of 35 per cent, although wider fluctuations in the annual catch might result.

The Atlantic herring stock is estimated at 3,800 million pounds, and the annual catch of 240 million represents only 6 per cent utilization. Most of the catch is taken during spawning runs in inshore

waters and processed into smoked, pickled, and canned products, although there is also a small reduction industry. If a mass market for herring products could be developed, much larger catches could be made, but better methods would have to be found to locate and catch the herring in offshore waters during summer and autumn months when they are highest in quality.

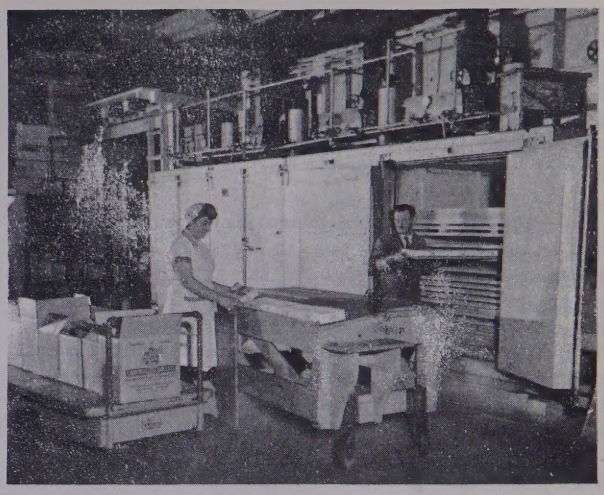
The Atlantic lobster fishery is intensive; the annual catch of 48 million pounds is believed to be about two-thirds of the legal-sized stock. A decrease in the stock is possible if, as predicted, average water temperatures begin to decline after 1960. However, it is thought that an effective management programme might maintain the catch at present levels until 1980.

The bulk of the Canadian commercial catch of fresh-water fish, 114 million pounds annually, is taken in lakes, especially Lake Erie and Lake Huron, Lake Winnipeg, Lesser Slave Lake in Alberta, and the Great Slave Lake in the District of MacKenzie. It is believed that stocks could sustain a 40 per cent increase in catch levels, principally in the prairie fisheries and in the coarser species, i.e., species other than whitefish, pike-perch, and trout, but an improvement in transportation facilities in those areas would be indicated. No forecast is made of possible improvements in the catch of trout, for instance, in the Great Lakes, as a result of measures for the control of the sea lamprey and other projects being developed under the International Great Lakes Fisheries Convention.

THE PRODUCTS

Fisheries products are classified into four major forms: fresh, frozen, cured, and canned, and these represent the various methods that have been used to arrest or delay the deterioration and spoilage of fish and shellfish from the time they leave the water. Drying was probably the earliest method used to preserve meat and fish, through the action of warm dry air where the climate was suitable; a further development was the application of salt to draw moisture from the flesh cells, or a combination of salting and drying, where periods of damp weather might hinder air drying alone. When the raw product was fatty or oily, salting and drying could not prevent the appearance of undesirable odour and colour, but smoking was found to be effective, and the exclusion of the oily fish from air was also found to retard rancidity. The combination of salting, smoking, and "tight coopering" to provide barrels that would retain brine and exclude air formed the basis of the extensive use of herring as food during the Middle Ages. When salt pickling was extended to include sugar, vinegar and spices, the range of cured products was multiplied many times.

Canning -- the sterilization of food by heat, with hermetical sealing to prevent bacterial rein-



A battery of four plate-type freezers for packaged fillets of Canadian fish.

fection from the air -- was improved and brought into extensive use by the end of the 19th century, and canned and cured products were widely distributed in world trade. Steam power for sea and rail transportation made it possible to provide inland consumers with nearly fresh fish, particularly when ice was used to slow down the process of deterioration. Where distances were great, however, as in North America, the development of commercial freezing and the establishment of distribution and holding facilities for frozen fish were necessary to the growth of a mass market. For a long time, frozen fish products were often poor in quality because of technical ignorance of the importance of fresh raw material, low temperatures, freezing time, and the exclusion of air. Later, quick-freezing and other improvements yielded frozen fish increasingly like fresh fish in taste, odour, and appearance.

It is obvious that a wide range of fisheries products is possible with more than 150 species and four methods of preparation with their numerous subforms or variants. Fisheries Statistics of Canada, 1953, issued by the Dominion Bureau of Statistics, lists about 400 products, with many small items included in "all other" groupings. These products are turned out for the most part close to the place where the fish are landed, and there is in the industry a high degree of integration of catching, processing and marketing activities.

MARKETING AND PRICES

The conditions under which fishermen sell their catch are so varied that no set of generalizations about the market for fish products is likely to be an adequate description. Three general types of primary market price arrangements are distinguishable, however: the negotiated "season" price, prices set by the leadership of the larger processing firms, and the "competitive" market price which

responds quite freely to short-run changes in the demand and supply situation.

It is apparent that fishermen distrust fluctuating prices and prefer the relative stability of a negotiated price or even a price set by the larger buyers. The relative bargaining power of buyers and sellers is important in either case. The third type of market is characteristic of the more perishable fresh products which cannot be stored to even out the supply in accordance with demand. Quick and frequent access to market information is essential to improve the fisherman's bargaining power in this situation. In the short run, price tends to settle at the level that will clear the supply offered on the market; over a longer period, supply is adjusted by changes in fishing effort and shifts to or from other forms of production, and the long-run tendency is for price to equal the cost of production.

Price is important: a quarter of a cent a pound would mean a difference of $2,000 to a vessel landing 800,000 pounds of groundfish in a season. This might mean, for instance, a change of $150 to $300 per man in the net crew shares and a much greater change in the boat share after operating expenses are paid. But price is, after all, only one blade of the price-cost scissors that determine the net income of the fisherman. He may tend to overlook the advantages to be gained by additional investment and the importance of quality and volume in relation to costs and productivity.

FUTURE DEMAND FOR FISHERY PRODUCTS

Because the capacity of the human stomach sets ultimate limitations upon food requirements, the future demand for fish products must be related to the growth of population. Median estimates place the probable increase in the Canadian population from 1955 to 1980 at two-thirds of the 1955 figure; that of the United States population, at 43 per cent. A first approximation to the level of demand for Canadian fisheries products that might be expected in 1980 would be provided, therefore, by increasing current domestic retention figures by two-thirds and average exports to the United States by 43 per cent.

This, of course, neglects a host of other considerations, one of the most important being the question of income levels in 1980. In recent years, the quantity of food consumed per head of population and the proportion of income spent for food have remained remarkably stable in the two countries -- the latter figure being about 25 per cent of disposable income. The demand for food in general, therefore, appears to be neither elastic nor inelastic with respect to change in income. Little information is available on which to estimate the income-elasticity of demand for fish; demand might be elastic for some "luxury" products such as lobster (i.e., a rise in incomes might result in a more-than-proportionate increase in the amount spent for lobster), but inelastic for fish products in general. United Nations Food and Agriculture Organization data indicate that the demand for fish is inelastic with respect to income changes in most countries.

There is some evidence that people with higher incomes eat more restaurant meals. Department of Fisheries surveys of fish distribution in four central Canadian cities after the war indicated that as much as 40 per cent, by value, of the fish products marketed at wholesale in those centres went to restaurants and institutions. Many fish products lend themselves to the pre-cooked and portioned packs for which there is an increasing demand by the restaurant trade. There is, therefore, reason for some optimism concerning the North American demand for fish products if incomes continue to rise -- but such optimism should be restrained because of further considerations. The price of a restaurant meal includes the cost of the services provided as well as the cost of the fish and other food served; in general, fish purchases at higher income levels are likely to have a higher quality or service content, hence increases in total expenditure for fish may not involve proportionate or even absolute increases in the quantity consumed. At the relatively high income levels now obtaining in North America, further increases in per capita income may not exert much influence, therefore, on the quantity of fish demanded at the primary level, although some particular products may, of course, benefit.

There is, also, little dependable evidence on which to base conclusions about the price-elasticity of demand for fish. Here, again, demand might be quite elastic for a specific product for which there are many good substitutes available, but inelastic for fisheries products as a whole. Would a ten per cent decrease in the price of frozen cod fillets, for example (the prices of other supposedly competitive protein foods, such as beef pot roast, remaining unchanged), bring a more-than-proportionate increase in the amount spent for cod fillets? Largely subjective or intuitive reasoning suggests that this is unlikely -- that consumers are not very responsive to moderate price changes in most fish products, in the short run at least. Even if demand could be shown to be elastic with respect to price in the long-run, prediction of an increased demand on that account would still have to rest on the assumption that the cost of production in the fisheries will be reduced at a faster rate than the costs of producing other "competitive" foods (i.e., that prices of fish products will decline relative to other food prices). In view of recent progress in the agriculture industry (for example, in the feeding of livestock and poultry for rapid growth), this would be a precarious assumption.

However, even if changes in incomes and price or cost relationships do not appear likely to

exert much influence on the level of demand in North America, population growth even at the most conservative estimates will be an important factor. Assuming per capita fish consumption to remain at current levels, a 40 or 50 per cent increase in the population would place the prospective stocks of many species under heavy strain, even without allowing for a probable increase in exploitation by other countries.

PROSPECTS FOR DEVELOPMENT

A growing Canadian population and the increasing industrialization and urbanization of that population have important implications for the development of the fishing industry. Secondary and service industries can only grow by recruiting a part of their labour force from the farms and fishing villages. Thus, as industrialization proceeds, fishermen and their sons and daughters leave the fishing industry as other employment opportunities become available to them, and the number of fishermen declines either absolutely or as a proportion of the total population. At the same time, increasing demand for fisheries products and improvements in boats and gear may increase the productivity and incomes of those remaining in the industry, making alternative opportunities less attractive and thus setting limits to the exodus from the industry. An increasing demand for fish and rising labour-costs would tend to stimulate capital investment for the improvement of fishing and processing equipment, to increase output per man and keep the unit cost of production from rising with the general wage-level. Changes of this nature have been taking place with accelerated pace in Canada during the past decade.

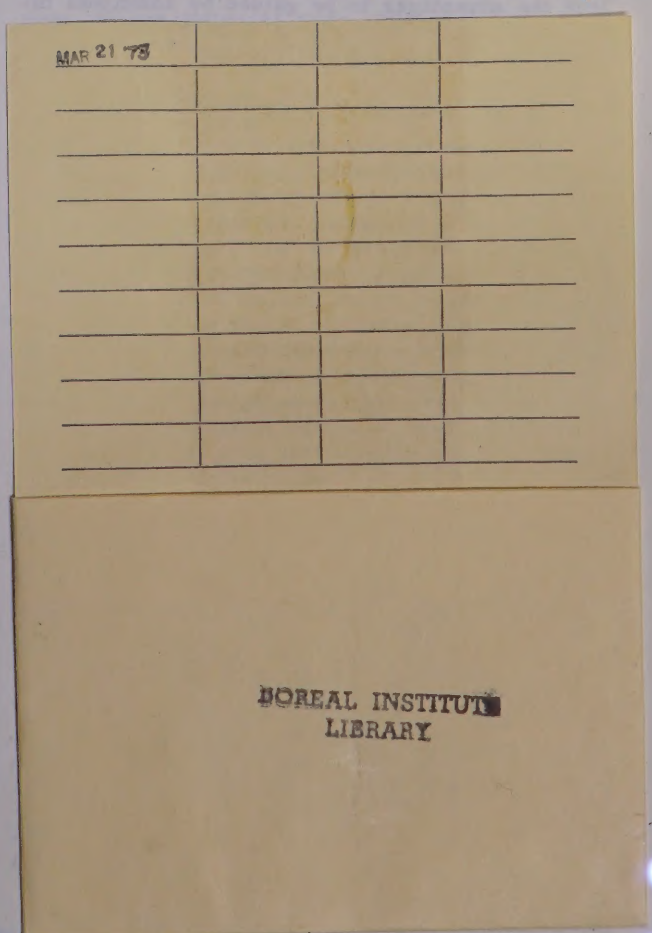
There are nearly 30,000 primary fishing enterprises in Canada. The amount of capital invested per fisherman varies widely according to the nature of the enterprise from as little as $500 in a primitive inshore operation to as much as $15,000 in a modern deep-sea dragger. Capital investment in the primary fishing industry in Canada has been increasing rapidly in post-war years, and the projection of recent rates of investment indicates capital requirements of $6 to $7 million a year, or a capital expansion by 1980 of some $100 million, after allowance for depreciation, above the estimated $150 million of capital investment in 1955.

In the secondary industry, there were in 1955 some 800 processing enterprises, with a total fixed capital value of $90 million and working capital of $60 million. Estimated requirements for capital expansion approximate a rate of 3.3 per cent in the Pacific area and five per cent or more in the Atlantic provinces, but it is considered unlikely that a five per cent rate can be maintained for the whole Atlantic region over the 25-year period.

Capital value figures, whatever the method of valuation or depreciation used, give very imperfect indications of changes in actual productive capacity. New fishing or processing units are likely to be much more efficient, dollar for dollar of capital valuation, than the units they replace. The recent heavy capital investment in boats and processing plants may have increased productivity in the industry (in spite of the creation of some over-capacity of at least a temporary nature) to a greater extent than is suggested by an estimated 50 per cent increase in primary fishing investment, in real terms, from 1943 to 1954.

The primary industry's labour force totals about 75,000 fishermen, of whom not more than 50,000 are dependent upon fishing as a major source of income. The number has been decreasing, and a continued decline is expected, but at a less rapid rate than that of the past eight years. A more moderate rate of decline, based on changes from 1937 to 1940 and 1947 to 1954, indicates a 16 per cent decrease in the number of fishermen between 1954 and 1980.

About 16,000 workers are now employed in the fish processing industry at peak production periods, a great many in small plants with an average of 20 workers each. Here, too, the concentration and mechanization of operations has led to the progressive reduction of the number of persons employed, and this process is expected to continue.



(Reprinted from Nov., 1957, issue of "Trade News" of the Department of Fisheries of Canada.)